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Title:A high-Q terahertz resonator for the measurement of electronic properties of conductors and low-loss dielectrics
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Abstract:The successful engineering of sources and components in the terahertz (THz) regime benefits from good characterization of materials properties. Previous research reports have shown that calculations of material parameters that are valid at radio frequencies are no longer accurate at THz frequencies. A high-quality-factor quasi-optical hemispherical resonator operating between 300 GHz-1 THz has been designed and implemented for the measurement of electronic properties of conductors as well as low-loss dielectrics. This apparatus is the first quasi-optical resonator to achieve Q ≈ 4 × 10sup5/sup at frequencies greater than 400 GHz in the THz regime. It is also the first open resonator designed to measure effective conductivity at these frequencies. This paper discusses the techniques that enabled high-Q operation in the THz regime. It also includes measurements of silicon with different doping densities and conductors of various surface roughness values with comparison to theoretical predictions. © 2012 IEEE.
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